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5.3-DAY ELEMENT 61

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A sample of fission 61, shown by mass spectrographic analysis to be predominantly mass 147 (61 isotopes of other masses were present to less than one part in two thousand), was irradiated by slow neutrons in the Clinton pile. After bombardment, a 5.3-day 61 activity was found to be present. The cross section for this reaction was approximately 60×10^{-24} cm^2. The radiations from this sample, as determined by absorption curves, were a ca. 2.5 Mev β^- and a 0.8 Mev γ. This is probably the same activity observed by Law, Pool, Kurbatov, and Quill.[1,2] They observed it as formed by Nd(p,n), Nd(d,n), and Nd(α,p). The second of these reactions is incompatible with our determination of the mass of this isotope.

To verify that the reaction involved was actually (n,γ) and hence that the mass of the 5.3-day element 61 was 148, a portion of the sample was analyzed by means of a mass spectrograph.[3] After separation, active isotopes were found at masses 147 and 148. To verify that the activity at mass 148 had a half-life of 5.3 days, the following technique was used: The photographic plate upon which the separated isotopes were deposited was placed successively against various parts of a larger photographic plate for times calculated to give equal intensity in the 148 position if its half-life were 5.3 days. Five exposures were taken for successive times of 33.2 hours, 40.7 hours, 52.3 hours, 72.3 hours, and 122 hours. Upon development, this large plate showed equal blackening at mass 148 and increasing blackening for successive transfers at mass 147. Thus the mass of the 5.3-day element 61 is 148.

REFERENCES

1. Law, Pool, Kurbatov, and Quill, Phys. Rev. 59: 936 (1941).

2. Kurbatov and Pool, Phys. Rev. 63: 463 (1943).

3. Inghram, M. G. and R. J. Hayden, Phys. Rev. 71: (1947).